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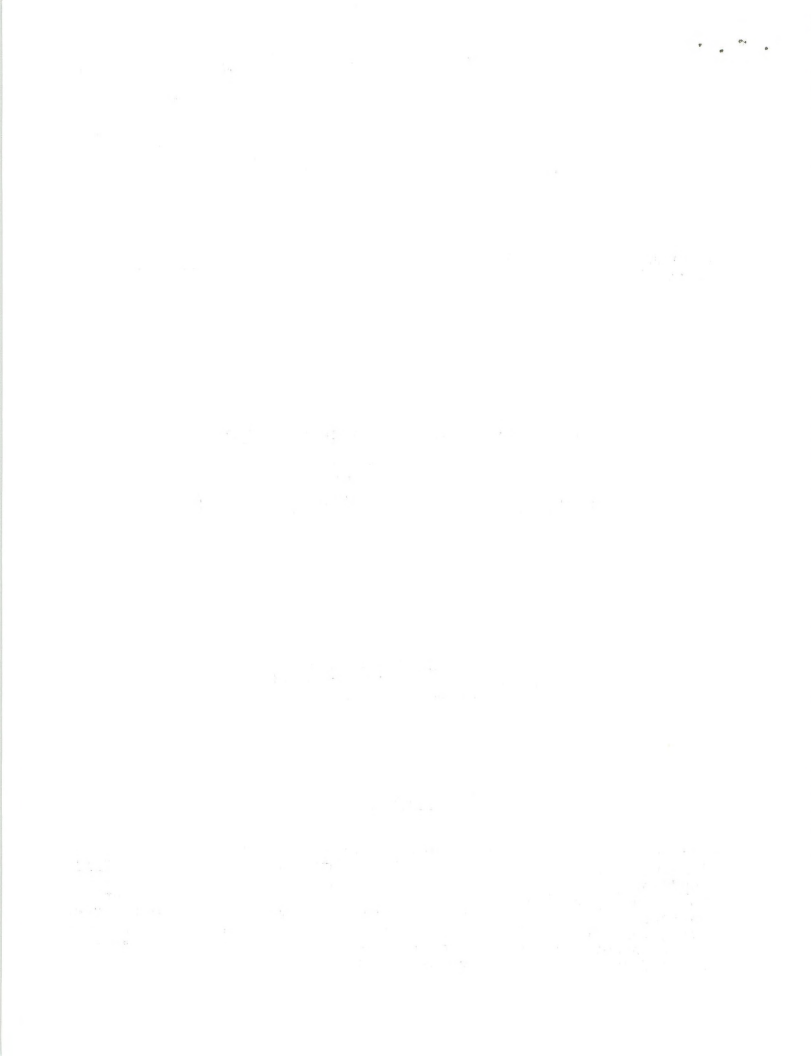
GROUND APPLICATION OF FOUR INSECTICIDES  
ON DOUGLASFIR TUSSOCK MOTH AND  
WESTERN SPRUCE BUDWORM POPULATIONS IN MONTANA

By

Steve Kohler, Entomologist  
Cooperative Forest Management  
Division of Forestry

SUMMARY

Four insecticides (Sevin, Orthene, Pyrocid Growers Spray and Dimilin) were tested against Douglasfir tussock moth larvae, Orgyia pseudotsugata (McDunnough), and western spruce budworm larvae, Choristoneura occidentalis Freeman, on Douglasfir near St. Ignatius, Montana, in June, 1976. Hydraulic spray equipment was used to treat four groups of five trees each. All treatments were highly successful, with corrected percent control of 100 for Douglasfir tussock moth and from 86 to 100 for western spruce budworm.



## INTRODUCTION

The importance of damage to western forests by outbreaks of Douglasfir tussock moth, Orgyia pseudotsugata (McDunnough) and western spruce budworm, Choristoneura occidentalis Freeman, has been well documented (Tunnock, 1973; Johnson and Denton, 1975). Loss of or damage to high-value trees in homeowner's yards, trailer courts, cemeteries, camp and picnic grounds, etc., need not be tolerated. The objectives of this test were:

1. To test and compare the effectiveness of ground applications of four chemical insecticides in reducing Douglasfir tussock moth and western spruce budworm larval populations on individual trees.
2. To provide data for registration by the manufacturer of one or more chemical insecticides which may be used by homeowners and land managers to protect individual high-value trees under attack by Douglasfir tussock moth or western spruce budworm.

## MATERIALS AND FORMULATION

After consultation with the USDA Douglasfir Tussock Moth Research and Development Program, the USDA Forest Service Insecticide Evaluation Project, and the USDA Forest Service Methods Application Group, the following materials and formulations were selected from several candidates:

Sevin (carbaryl) - Sevin 50W (50 percent wettable powder) was provided by Union Carbide Corporation and was applied at a dosage rate of 1 pound a.i. per 100 gallons of water.

Orthene - Orthene 75S (75 percent soluble powder) was provided by Chevron Chemical Company and was applied at a dosage rate of .5 pound a.i. per 100 gallons of water.

Stabilized Pyrethrins - Pyroicide Growers Spray 7083 (1.4 percent liquid concentrate) was provided by McLaughlin Gormley King Company and was applied at a dosage rate of .1 pound a.i. per 100 gallons of water.

Dimilin - Dimilin W-25 (T-H 6040) (25 percent wettable powder) was provided by Thompson Hayward Chemical Company and was applied at a dosage rate of 2 ounces a.i. per 100 gallons of water.

## TEST DESIGN

Each treatment, including the check, consisted of one open-grown Douglasfir tree 20-50 feet tall. The treatments were replicated five times, so that a group of five trees was treated with each of



the four insecticides and a group of five trees served as checks. Tree groups were separated sufficiently to minimize spray drift between groups. Insecticides were applied June 25, 1976. Application was timed so that Douglasfir tussock moth egg hatch was completed and the larvae had migrated to the foliage and begun feeding. Larval development for the two species on the day previous to spraying was as follows:

Douglasfir Tussock Moth

<u>Larval Instar</u>	<u>Percent</u>
First	84
Second	16

Western Spruce Budworm

<u>Larval Instar</u>	<u>Percent</u>
Second	4
Third	14
Fourth	26
Fifth	29
Sixth	27

Larval populations were sampled the day before spraying and 4 days after treatment with Orthene and Pyroclide Growers Spray, 4 and 8 days after treatment with Sevin, and 8 and 14 days after treatment with Dimilin. Larval populations for each period were sampled by clipping eight 15-inch branches from mid-crown of each treatment tree with an extendable pole pruner equipped with catch basket. Larvae on the sample branches were counted in the field and expressed as number per 1,000 square inches of foliage. Four categories of larvae were recorded: (1) Douglasfir tussock moth, (2) western spruce budworm, (3) sawflies (Neodiprion sp.), and (4) other lepidopterous larvae (mainly Geometridae and Dioryctria sp.)

Spray was applied using a Division of Forestry fire pumper equipped with a 200 gallon fiberglass tank and a centrifugal four-stage WGC-4-SP Pacific pump. The nozzle used was an Elkhart Select-O-Flow, adjustable from 10 to 30 gallons flow per minute. All sprays were applied to the point of run-off. An average of 5 to 10 gallons of spray was applied per tree.

RESULTS

Test results were highly successful and indicated that any of the four materials would be suitable for control of Douglasfir tussock



moth or western spruce budworm on high-value trees by private homeowners and land managers. Although the test sprays were applied with equipment that developed up to 200 p.s.i. pressure and was capable of reaching to heights of 50 feet and more, any of a variety of conventional sprayers available to private landowners would be sufficient to apply the material. The important consideration with non-persistent sprays is to insure that the entire tree crown is fully covered.

Results of the tests are summarized in the following tables:

Douglasfir Tussock Moth

Treatment	Prespray Density <sup>1/</sup>	Postspray Density <sup>1/</sup>			Percent Reduction <sup>2/</sup>		
		4 day	8 day	14 day	4 day	8 day	14 day
Check	3.62	3.39	3.34	2.73	6	8	25
Sevin	7.99	0.32	0.00	---	96	100	---
Orthene	6.79	0.00	---	---	100	---	---
Pyrocide	7.83	0.00	---	---	100	---	---
Dimilin	5.03	---	0.60	0.00	---	87	100

Western Spruce Budworm

Treatment	Prespray Density <sup>1/</sup>	Postspray Density <sup>1/</sup>			Percent Reduction <sup>2/</sup>		
		4 day	8 day	14 day	4 day	8 day	14 day
Check	21.15	18.19	22.18	16.70	14	0	21
Sevin	23.72	0.95	0.31	---	95	99	---
Orthene	12.73	0.00	---	---	100	---	---
Pyrocide	6.71	0.28	---	---	95	---	---
Dimilin	17.06	---	7.79	1.90	---	62	86

<sup>1/</sup> Larvae per 1000 in.<sup>2</sup> foliage surface.

<sup>2/</sup> Percent control was corrected according to Abbott's formula.





Sawflies (Neodiprion sp.)

Treatment	Prespray Density <sup>1/</sup>	Postspray Density <sup>1/</sup>			Percent Reduction <sup>2/</sup>		
		4 day	8 day	14 day	4 day	8 day	14 day
Check	3.90	5.55	2.13	1.82	0	45	53
Sevin	3.73	0.00	---	---	100	---	---
Orthene	6.23	0.00	---	---	100	---	---
Pyrocide	19.58	0.00	---	---	100	---	---
Dimilin	16.78	---	2.10	0.00	---	76	100

Other lepidopterous larvae (Chiefly Geometridae and Dioryctria sp.)

Treatment	Prespray Density <sup>1/</sup>	Postspray Density <sup>1/</sup>			Percent Reduction <sup>2/</sup>		
		4 day	8 day	14 day	4 day	8 day	14 day
Check	3.62	2.77	4.56	3.64	23	0	0
Sevin	2.13	0.32	0.31	---	81	85	---
Orthene	1.98	0.31	---	---	80	---	---
Pyrocide	1.12	0.00	---	---	100	---	---
Dimilin	0.84	---	1.20	0.00	---	0	100

<sup>1/</sup> Larvae per 1000 in.<sup>2</sup> foliage surface.

<sup>2/</sup> Percent control was corrected according to Abbott's formula.



#### REFERENCES

- Johnson, P. C., and R. E. Denton, 1975. Outbreaks of the western budworm in the American Northern Rocky Mountain area from 1922 through 1971. USDA Forest Service, Gen. Tech. Rep. INT-20.
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